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This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

INVENTOR(S)

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☐ *Additional inventors are being named on the____ separately numbered sheets attached hereto*

TITLE OF THE INVENTION (280 characters max)

PREPARATION AND USE OF HIGH OMEGA-3 AND OMEGA-6 FEED

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ENCLOSED APPLICATION PARTS *(check all that apply)*

☒ Specification *Number of Pages* 11 ☐ CD(s), Number

☐ Drawing(s) *Number of Sheets* ☐ Other (specify)

☐ Application Data Sheet. See 37 CFR 1.76

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Respectfully submitted,

Date 14/12/04

SIGNATURE

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P19SMALL/REV06

PREPARATION AND USE OF HIGH OMEGA-3 AND OMEGA-6 FEED

BACKGROUND OF THE INVENTION

High blood lipid levels, especially cholesterol and triglycerides, are a concern to a significant proportion of the population. However, some fats, particularly omega-3 polyunsaturated fatty acids have been shown to have beneficial effects in reducing the risk of heart disease and other conditions. As such, increasing the omega-3 content of food products has long been a goal.

Some prior art methods have the disadvantage of imparting a "fishy" odor to the food products produced by or from animals, or reducing milk-producing or egg-laying production or capacity. Thus, although the benefits of products having higher omega-3 and/or omega-6 content is well established, attaining these products in an acceptable and economical way has not been as straight-forward.

For example, US Patent 5,133,963 teaches a method of producing poultry products with increased concentrations of omega-3 fatty acids using a poultry feed that has omega-3 polyunsaturated fatty acids and vitamin E and an enriched water which is fed to the poultry separately. The preferred omega-3 source is "vacuum deodorized fish oil".

US Patent 5,012,761 teaches feeding chickens a composition including fish oil for producing eggs having higher levels of polyunsaturated omega-3 fatty acids.

US Patent 4,918,104 teaches a method of increasing the concentration of omega-3 polyunsaturated fatty acid in poultry eggs which comprises administering

to the hens an effective amount of preformed omega-3 polyunsaturated fatty acid or a metabolic precursor thereof. Examples of metabolic precursors given include linolenic acid, linseed oil, fish or a fish derivative. The feed itself comprised 45-65% corn.

EP 1 021 083 teaches a poultry feeding regime which results in a higher incorporation efficiency of omega-3 fatty acids which involves feeding the poultry a higher amount of omega-3 fatty acid in the later phase of the poultry's production period.

EP 678 247 teaches a food product having a ratio of omega-6 fatty acid to omega-3 fatty acid of 3:1 to 10:1. for reducing inflammatory and allergic skin responses.

EP 775 449 describes a method of feeding poultry oil high in omega-3 fatty acid and omega-6 fatty acid derived from specific microorganisms.

Published US Patent Application 2003/0211221 teaches a method of producing milk enriched with omega-3 fatty acid and/or omega-6 fatty acid wherein omega-3 and/or omega-6 are mixed with a protective fat which is not degraded or hydrogenated in the rumen. Examples of protective fats include tristearine and other tri-saturated triacylglycerols and di-saturated triacylglycerols.

Published US Patent Application 2001/0000151 teaches a food product comprising a mixture of microflora Thraustochytrium, Schizochytrium and mixtures thereof and flaxseed, rapeseed, soybean and avocado meal which has a balance of long chain and short chain omega-3 highly unsaturated fatty acids.

US Patent 5,985,348 teaches a process for producing microbial products with a high concentration of omega-3 fatty acid and the addition thereof to

processed foods and feeds.

US Patent 5,693,358 teaches a method of preparing an animal feed wherein powdered fish oil is made by processing fishes.

PCT Application WO99/08540 teaches a method of producing a dairy product enriched in conjugated linoleic acids (CLA) and/or other beneficial unsaturated fatty acids by feeding the ruminant a diet that includes fish oil or fish meal.

PCT Application WO 98/47389 teaches a method for producing omega-3 fatty acid enriched eggs using a feed comprised of corn, soybean meal, flaxseed, oyster shell, limestone, salt, vitamin premix, mineral premix, vitamin E premix, methionine, animal/vegetable fat blend, pectinase and glucanase enzyme product and phosphorus.

PCT Application WO 95/21539 teaches a feed for producing eggs having an increased omega-3 fatty acid content comprising 1.5-2.5% fish oil, 1-4% linseed oil and an antioxidant.

PCT Application WO 00/44239 teaches a feed additive comprising a source of DHA and feather meal.

As will be appreciated by one of skill in the art, in view of concerns regarding outbreaks of diseases such as bovine spongiform encephalopathy (BSE), the use of animal products in feed is undesirable. Clearly, a feed product capable of producing enhanced levels of omega-3 in animal by-products that does not contain animal products is needed.

SUMMARY OF THE INVENTION

According to a first aspect of the invention, there is provided a method of preparing an animal feed product comprising:

grinding a quantity of a pulse product into a powder;

mixing oilseeds with the powder, thereby forming a mixture;

subjecting the mixture to heat and pressure, thereby gelatinizing the mixture; and

releasing the heat and the pressure and extruding the mixture.

BRIEF DESCRIPTION OF THE DRAWINGS

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the invention belongs. Although any methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present invention, the preferred methods and materials are now described. All publications mentioned hereunder are incorporated herein by reference.

Described herein is an improved feed product which protects biologically active substances within the feed such that the biologically active substances are not degraded or decomposed prior to reaching desired absorption sites within the digestive tract of the animal. Specifically, in one embodiment, there is provided an improved feed product for ruminants, wherein the biologically active substances, for

example, omega-3 fatty acids, pass through the rumen without decomposition and are subsequently absorbed in the abomasums and subsequent digestive tract. In another embodiment, there is provided a feed product for poultry. As a result, use of the feed results in animal products, for example, eggs, milk and meat, having elevated levels of the biologically active substances.

As discussed below, the feed is prepared by grinding a quantity of one or more pulse products to a fine powder. The powder is then mixed with intact oilseeds so as to form a homogeneous mixture. The mixture is subjected to a combination and heat and pressure which causes partial gelatinization of the mixture which in turn makes the carbohydrates and starches therein more digestible. Release of the pressure causes the oilseeds to break apart such that the oil is released into the mixture and is coated by the ground pulse products, as discussed below. The mixture is then extruded and cut into feed pellets.

It is important to note that the prior art teaches that ground oilseed or oil extracted from oilseeds must be used in the preparation of feed so that the animal does not have to digest the seed itself.

As will be appreciated by one of skill in the art, the determination of the ingredients used is based on the need to meet a specific nutrient analysis for a given feed product, for example, specific oil levels, protein, omega fatty acids and ruminant by-pass values.

Preferably, the feed product has a fatty acid content between 18.5-22.5%. Preferably, omega-3 fatty acid is 47.5-57.5% of the total fatty acid content while omega-6 fatty acid is 14-24% of the total fatty acid content. In addition, the feed

product preferably has a protein content of 15-25%.

In one embodiment, the feed product comprises 45-55% pulse products and 45-55% oilseed. In an alternative embodiment, the feed product comprises 65-85% oilseed and 15-35% pulse products.

The pulse products may be peas, lentils, chick peas, fababeans, white beans and the like or combinations thereof.

The oilseeds may be flax, sunflower, safflower, rapeseed, canola or soybean and the like or combinations thereof.

As will be appreciated by one of skill in the art, the quality of grains and oilseeds may be variable, meaning that the exact proportion that is used in the combinations to make up the feed product could be increased or decreased depending on the desired oil and protein levels.

For example, oil seeds which are off-grade, for example, no more than 20% off grade, may be used and the specific quantity used determined by the calculated nutrient analysis.

For preparation, the dry ingredients are mixed together to form a homogeneous mixture and this mixture is then fed into an extruder. Initially, the pulse products are ground to a fine powder, for example, through a #14 screen or a #7 screen. As will be known by one of skill in the art, a #7 screen has a screen size of 7/64 of an inch. After having been ground in this manner, the pulse products have a consistency that is 60-80% of flour, the balance being 5 microns. The oil seeds are left in an unground state. The extruder mechanically creates restrictions which in turn creates high levels of friction. This in turn heats the mixture and causes the mixture to become gelatinized

which in turn makes the carbohydrates and starches more digestible. While not wishing to be bound to a specific theory, it is believed that the pressure and pressure release causes the cell walls to be broken down. Furthermore, cells that hold the oil of the oilseed grains effectively exploded during this process and release the oil so it is no longer part of the seed. Thus, on digestion, the oil is available for use by the animal without the need for the animal to digest the seed itself. It is further believed that the oil is driven in the ground pea articles which in turn results in the ruminant by-pass.

In the case of the production of our products pressure is standard (20-30 psig?). The temperature on Linpro could be 255F (124C) to 275F (135C). The most optimum temperature is 265F to 268F (129C-131C). Dairy pro the same holds true with pressure but the temperature range could be 300F (149C) to 325F (163C). The optimum temperature should be 315F to 318F (157C-159C).

In most embodiments, peas are the pulse crop of choice for making the feed products. Specifically, peas have a higher level of absorbance and do the best job of encapsulating the oil that is released from the oil seeds. Peas need to be ground fine to expose as much starch as possible to accomplish this encapsulating. Specifically, pea starch is very absorbent and has a great wicking effect on fluids. The starch also has the greatest ability to keep the oil in suspension under abusive conditions.

Alternatively, in those embodiments wherein soybeans are used, the soya meal is heated to a higher temperature because soya has anti-nutritional factors that need to be removed.

One clear advantage of the invention is that the animal feed product produced

thereby is substantially animal by-product free. We are creating a product that is a competitor to fishmeal or fish oil. The emphasis is to be animal by-product free .Aquatic product are considered animal by products.

There is significant improvement in the digestibility of the fatty acids because of the fact that they are free from the seed. The animal does not have to spend any energy to separate the oil from the other nutritional components. The other nutritional components have an added level of digestibility because of extrusion.

The invention will now be further illustrated by way of examples. However, the invention is not limited to the examples.

To achieve the desired omega values in the end products, for example, eggs, poultry meat and pork, we combine 50% flax and 50% peas and extrude them as discussed above. After extrusion, we achieve a fatty acid profile of

1. total fat [ee]%= 20.25
2. total saturated %= 9.0
3. total unsaturated %= 91.0
4. munic C 14:0% = .05
5. palmitic 16:%= 5.79%
6. stearic C 18.0%=2.71
7. oleic c 18:1%=19.0
8. linoleic c 18:2%=14.3
9. alfa linolenic c 18:3% =57.0

This type of profile as allowed us to achieve omega 3 numbers in broiler chicken boneless and skinless breast and thighs that on a normal basis are 4.50% to

10.85%. This has been achieved by feeding 10% feed as described above that has been balanced in a normal diet. The other nutritional properties are used as part of the diet balancing.

In trials with egg we were able to achieve with the addition of 15% feed as described above an improvement of omega 3 levels from 0.14% on a 50 gram egg to 0.57% on the same size of egg.

Milk trials indicate an improvement from a normal 0.34% of omega3 to 0.96%.

As will be appreciated by one of skill in the art, other suitable feed formulas described herein will produce similar results.

While the preferred embodiments of the invention have been described above, it will be recognized and understood that various modifications may be made therein, and the appended claims are intended to cover all such modifications which may fall within the spirit and scope of the invention.

CLAIMS

1. A method of preparing an animal feed product comprising:

grinding a quantity of a pulse product into a powder;

mixing oilseeds with the powder, thereby forming a mixture;

subjecting the mixture to heat and pressure, thereby gelatinizing the mixture; and

releasing the heat and the pressure and extruding the mixture.

ABSTRACT

A method of preparing an animal feed comprising a mixture of at least one pulse product ground into a fine powder and a quantity of oilseeds is herein described. Also described is the use of the feed in the production of animal products having increased levels of omega-3 and omega-6 fatty acids.